

RESCUING WATER FROM THE ROOF

Part 1

Step 1:

Read the article **Paving Paradise: The Peril of Impervious Surfaces**, <http://ehponline.org/article/info:doi/10.1289/ehp.113-a456>.

Step 2:

Answer the following questions:

- Look at the graph titled “Impervious Cover of Various Land Uses” on page A458. What percentage of land is covered by the impervious roof surface for a common industrial complex?
- List three examples of problems caused by impervious surfaces.
- Give three examples of how a large amount of impervious surfaces may adversely affect human health.
- Provide examples of how porous pavements and green roofs help solve identified problems.

Part 2

Step 3:

Per your teacher’s instructions, assemble into groups. Each group should have at least one tape measure with meter units. Each group member should have a pencil, calculator, and the Water Data Sheet, below. Your group will measure the perimeter of your assigned building. Below are some tips to help you.

- » Remember to measure in the unit of meters. It is much easier to calculate the area and volume using meters compared to feet and inches.
- » Perimeter = the sum of the lengths of all sides.
- » Area = the number of square units needed to cover a surface (two dimensional).
- » If your school building is not square or has angled walls, you may find it helpful to draw the building layout on paper, then partition the building into squares, rectangles, triangles, circles, or other shapes. This will help you calculate the area.

Water Data Sheet

Side of Building	Notes/Description (e.g., east, front, cafeteria wall)	Length in Meters
1		
2		
3		
4		
5		
6		
7		
8		
9		
Area: Show your work and write the units (attach additional pages as needed to show your calculations).		

Step 4:

Fill in the Water Conversion Table below to calculate the volume of water in cubic meters and gallons that could be collected from the roof during two different rainstorms. Unless your teacher instructs otherwise, assume the roof of your school building is flat. Show your work on a separate sheet of paper and clearly show unit cancellations. Unit conversions are listed below.

- » Volume = the number of cubic units to fill a three-dimensional space
- » 1 cubic meter = 264.2 gallons [US, liquid]
- » 1 centimeter = 0.01 meter = 0.39 inch

Water Conversion Table

	Rained 1"	Rained 2.7"
Convert inches to centimeters (cm)		
Convert cm to meters (m)		
Volume of rain off the roof (m ³)		
Volume of rain gallons		

Step 5:

If the average rain barrel holds 55 gallons, how many rain barrels would you need to collect all of the water from a storm that produces 1" of rain? Show your calculation below or on a separate piece of paper.

RESOURCES:

Environmental Health Perspectives, News by Topic page. Choose Water Pollution, Built Environment, <http://ehp03.niehs.nih.gov/article/browsenews.action>

Math is Fun, Area of Plane Shapes, <http://www.mathsisfun.com/area.html>

Online Conversions, <http://www.onlineconversion.com/>

The Rain Water Harvesting Community, <http://www.harvesth2o.com>

Water Muddle Up and Clean up, UNC Superfund Basic Research Program, http://www.ie.unc.edu/erp/resources/Water_Muddle_Up_and_Clean_Up_Lesson.pdf